We claim:

1. A method for the enzyme-mediated, site-specific, in-vivo localization of water-insoluble molecules within a tumor, which comprises:

the administration of a water-soluble prodrug molecule to an animal;

said prodrug being a substrate to said enzyme and hydrolyzed by said enzyme molecules present within the tumor, said hydrolysis forming a water-insoluble drug precipitate molecule, wherein said precipitate is trapped within the tumor.

2. The method as recited in claim 1, wherein the enzyme is produced naturally by tumor cells.

3. The method as recited in claim 2, wherein the enzyme is produced at concentrations higher than that in normal tissues.

4. The method as recited in claim 2, wherein the enzyme is specifically expressed by the tumor cells following gene therapy.

5. The method as recited in claim 1, wherein the enzyme is selected from the group consisting of a phosphatase, a cellulase, a deaminase, a decarboxylase, a DNAse, an endonuclease, an exonuclease, a glucokinase, a glucosidase, a glutaminase, a glutathionase, a guanidinobenzodase, a glucoronidase, a hexokinase, an iduronidase, a manosidase, a nitrophenylphosphatase, a peptidase, a protease, an RNAse, and a sulfatase.

6. The method as recited in claim 1, wherein the enzyme is localized specifically on the surfaces of tumor cells, following the administration of said enzyme chemically conjugated to a targeting moiety.

7. The method as recited in claim 6, wherein the targeting moiety is a ligand that binds specifically to a tumor-specific receptor.

8. The method as recited in claim 7, wherein the ligand is selected from the group consisting of an antibody, a peptide, and a hormone.

9. The method as recited in claim 8, wherein the receptor is a tumor-specific antigen.

10. The method as recited in claim 8, wherein the receptor is specific to

the peptide.

11. The method as recited in claim 8, wherein the receptor is specific to the hormone.

12. The method as recited in claim 6, wherein the conjugate is injected intravenously, intra-arterially, subcutaneously, into the lymphatic circulation, intraperitoneally, intrathecally, intratumorally, or intravesically.

13. The method as recited in claim 1, wherein the water-soluble prodrug is injected intravenously, intra-arterially, subcutaneously, into the lymphatic circulation, intraperitoneally, intrathecally, intratumorally, intravesically, or is given orally.

14. The method as recited in claim 1, wherein the prodrug substrate is represented by the following formula:

R^1–D–(O–BLOCK)

wherein BLOCK is a blocking group that can be cleaved from the remainder of the substrate by action of an enzyme, resulting in a water-insoluble drug molecule represented by the following formula:

R^1–D–O–H

wherein D contains a minimum of 2 linked aromatic rings, and R^1 is a radioactive atom, a radiolabeled moiety with one or more radioactive atom(s), a boron atom, or a moiety labeled with one or more boron atoms.

15. The method as recited in claim 14, wherein the radiolabel is selected from the group consisting of a gamma emitting radionuclide suitable for gamma camera imaging, a positron emitting radionuclide suitable for positron emission tomography, and an alpha or a beta particle emitting radionuclide suitable for therapy.

16. The method as recited in claim 15, wherein the alpha particle emitting radionuclide is astatine-211, bismuth-212, or bismuth-213.

17. The method as recited in claim 15, wherein the beta particle emitting radionuclide emits beta particles whose energies are greater than 1 keV.

18. The method as recited in claim 15, wherein the beta particle emitting radionuclide is iodine-131, copper-67, samarium-153, gold-198, palladium-109, rhenium-186, rhenium-188, dysprosium-165, strontium-89, phosphorous-32, phosphorous-33, or yttrium-90.

19. The method as recited in claim 14, wherein the boron atom is suitable for neutron activation.

20. The method as recited in claim 14, wherein the BLOCK is selected from the group consisting of:

a monovalent blocking group derivable by removal of one hydroxyl from a phosphoric acid group, a sulfuric acid group, or a biologically compatible salt thereof;

a monovalent blocking group derivable by removal of a hydroxyl from an alcohol or an aliphatic carboxyl, an aromatic carboxyl, an amino acid carboxyl, or a peptide carboxyl; and

a monovalent glycoside derived by the removal of the anomeric hydroxyl group from a mono- or polysaccharide.